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MACTEC ENVIRONMENTAL RESTORATION SERVICES, LLC

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole 11-01-11

Borehole Information

Farm : AX	**Tank :** AX-101	**Site Number :** 299-E25-105
N-Coord : 41,773	**W-Coord :** 47,495	**TOC Elevation :** 680.00
Water Level, ft :	**Date Drilled :** 12/31/1974	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 100	

Borehole Notes:
This borehole was drilled in December 1974. It was driven to 100 ft with 6-in. casing. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness of schedule-40, carbon-steel pipe. The zero reference is the top of the borehole pipe, which is even with the ground surface.

Equipment Information

Logging System : 2	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 05/1996	**Calibration Reference :** GJPO-HAN-5	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 08/28/1996	**Logging Engineer:** Bob Spatz
Start Depth, ft.: 98.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 16.5	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 08/29/1996	**Logging Engineer:** Bob Spatz
Start Depth, ft.: 17.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 0.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 3	**Log Run Date :** 08/29/1996	**Logging Engineer:** Bob Spatz
Start Depth, ft.: 30.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 8.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Borehole 11-01-11

Log Event A

Analysis Information

Analyst : E. Larsen

Data Processing Reference : P-GJPO-1787 Analysis Date : 10/31/1996

Analysis Notes :

This borehole was logged in three log runs. The third log run repeated a segment of the borehole to demonstrate the system repeatability. The pre- and post-survey field verification spectra met the acceptance criteria established for the peak shape and system efficiency, confirming that the SGLS was operating within specifications. The energy calibration and peak-shape calibration from these verification spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during the logging operation. Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

Cs-137 contamination was detected continuously within the upper 8.5 ft of the borehole and between 22.5 and 25.0 ft. Detectable quantities (less than 2.0 pCi/g) were also noted at 21.5 ft, 26 ft, 41 ft, and 52.5 ft, and from 97.5 to 98 ft. The maximum Cs-137 concentration in the near-surface continuous zone was about 12 pCi/g.

As a quality assurance measure, the segment of the log between depths of 8 and 30 ft was repeated to assure repeatability of the measured radionuclide concentrations. The concentrations of the naturally occurring radionuclides (KUT) and Cs-137 were calculated using data sets provided by the original and repeated logging runs. The measured radionuclide concentrations using the separate data sets were within the 2-sigma uncertainty of the calculations, indicating very good repeatability of the measurements.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank AX-101.

Log Plot Notes:

Separate log plots show the man-made radionuclide (Cs-137) and the naturally occurring radionuclides (KUT). The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL of a radionuclide, which represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, in addition to the total gamma derived from the spectral data and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

Separate plots are included that compare the measured concentration of the man-made radionuclides (Cs-137) and the naturally occurring radionuclides (KUT) over the repeated log interval. The radionuclide concentrations shown were calculated using the separate data sets provided by the original and rerun logging runs.